# Operating Instructions

**Capacitive rod electrode for level detection**

## VEGACAP 64

- transistor (NPN/PNP)

Document ID: 30014

# Contents


**1 About this document**
- 1.1 Function ... 4
- 1.2 Target group ... 4
- 1.3 Symbolism used ... 4

**2 For your safety**
- 2.1 Authorised personnel ... 5
- 2.2 Appropriate use ... 5
- 2.3 Warning about incorrect use ... 5
- 2.4 General safety instructions ... 5
- 2.5 Safety label on the instrument ... 6
- 2.6 CE conformity ... 6
- 2.7 Safety instructions for Ex areas ... 6
- 2.8 Environmental instructions ... 6

**3 Product description**
- 3.1 Configuration ... 7
- 3.2 Principle of operation ... 8
- 3.3 Operation ... 9
- 3.4 Storage and transport ... 9
- 3.5 Accessories and replacement parts ... 10

**4 Mounting**
- 4.1 General instructions ... 11
- 4.2 Mounting instructions ... 12

**5 Connecting to power supply**
- 5.1 Preparing the connection ... 13
- 5.2 Connection procedure ... 13
- 5.3 Wiring plan, single chamber housing ... 14
- 5.4 Wiring plan - version IP 66/IP 68, 1 bar ... 17

**6 Setup**
- 6.1 General information ... 18
- 6.2 Adjustment elements ... 18
- 6.3 Function chart ... 21

**7 Maintenance and fault rectification**
- 7.1 Maintenance ... 22
- 7.2 Rectify faults ... 22
- 7.3 Exchange of the electronics module ... 23
- 7.4 How to proceed in case of repair ... 25

**8 Dismounting**
- 8.1 Dismounting steps ... 26
- 8.2 Disposal ... 26

**9 Supplement**
- 9.1 Technical data ... 27
- 9.2 Dimensions ... 31


30014-EN-130916

**Supplementary documentation**

**Information:**
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

**Instructions manuals for accessories and replacement parts**

**Tip:**
To ensure reliable setup and operation of your VEGACAP 64, we offer accessories and replacement parts. The corresponding documentations are:

- 30174 - Electronics module VEGACAP series 60
- 34296 - Protective cover
- 31088 - Flanges according to DIN-EN-ASME-JIS-GOST

Editing status: 2013-08-21

30014-EN-130916

# 1 About this document

## 1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

## 1.2 Target group

This operating instructions manual is directed to trained specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

## 1.3 Symbolism used

**Information, tip, note**
This symbol indicates helpful additional information.

**Caution:** If this warning is ignored, faults or malfunctions can result.

**Warning:** If this warning is ignored, injury to persons and/or serious damage to the instrument can result.

**Danger:** If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

**Ex applications**
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence of actions**
Numbers set in front indicate successive steps in a procedure.

**Battery disposal**
This symbol indicates special information about the disposal of batteries and accumulators.

30014-EN-130916

# 2 For your safety

## 2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

## 2.2 Appropriate use

The VEGACAP 64 is a sensor for point level detection.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

## 2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

## 2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

## 2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

## 2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of "www.vega.com".

## 2.7 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

## 2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

# 3 Product description

## 3.1 Configuration

**Scope of delivery**

The scope of delivery encompasses:

- VEGACAP 64 point level switch
- Documentation
  - this operating instructions manual
  - Safety Manual - 31815 "*VEGACAP series 60 - Transistor (NPN/PNP)*" (optional)
  - Supplementary instructions manual "*Plug connector for level sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - if necessary, further certificates

**Constituent parts**

The VEGACAP 64 consists of the components:

- Housing cover
- Housing with electronics
- Process fitting with electrode

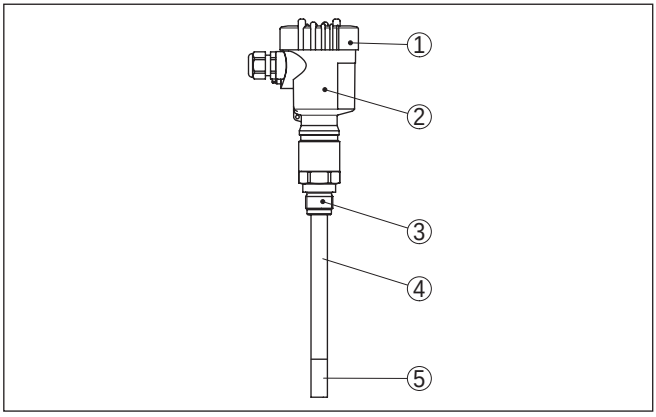


*Fig. 1: VEGACAP 64 - with plastic housing*

*1 Housing cover*
*2 Housing with electronics*
*3 Process fitting*
*4 active screen segment*
*5 active probe*

**Type plate**

The nameplate contains the most important data for identification and use of the instrument:

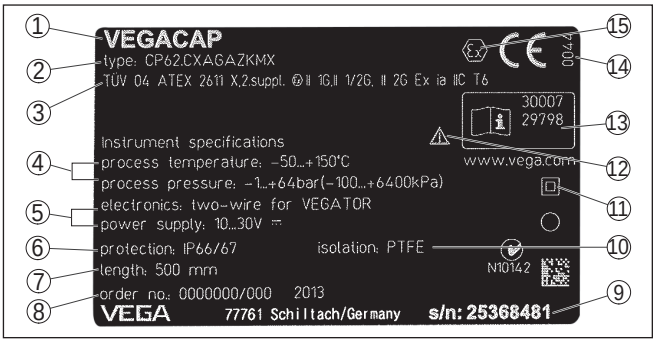


*Fig. 2: Layout of the type label (example)*

1 *Instrument type*
2 *Product code*
3 *Approvals*
4 *Process and ambient temperature, process pressure*
5 *Power supply and signal output, electronics*
6 *Protection rating*
7 *Probe length*
8 *Order number*
9 *Serial number of the instrument*
10 *Material, wetted parts*
11 *Symbol of the device protection class*
12 *Reminder to observe the instrument documentation*
13 *ID numbers, instrument documentation*
14 *Notified authority for CE marking*
15 *Approval directives*

With the serial number, you can access the delivery data of the instrument via www.vega.com, "*VEGA Tools*" and "*serial number search*". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

## 3.2 Principle of operation

**Area of application**

VEGACAP 64 is a level switch with fully insulated, capacitive electrode with active screen segment and active tip for level detection.

VEGACAP 64 is very rugged and maintenance-free and can be used in all areas of industrial process technology.

Typical applications are overfill and dry run protection.

Fully insulated probes with screen segment like VEGACAP 64 are preferably used in conductive, very adhesive liquids.

Due to the mechanical constructions of the active screen segment and the active tip, buildup on the probe can be compensated.

The capacitive measuring principle places no special requirements on installation. Hence, many different applications can be equipped with VEGACAP 64.

The instrument can also be used problem-free in corrosive products.

**Functional principle**

Probe, measured product and vessel wall form an electrical capacitor. The capacitance is influenced by three main factors.

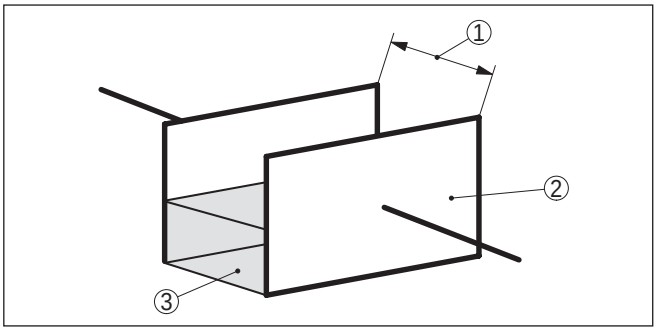


*Fig. 3: Functional principle - Plate capacitor*

*1 Distance between the electrode surfaces*
*2 Size of the electrode surfaces*
*3 Type of dielectric between the electrodes*

The probe and the vessel wall are the capacitor plates. The measured product is the dielectric. Due to the higher dielectric constant of the product compared to air, the capacitance increases as the probe is gradually covered.

The capacitance change is converted by the electronics module into a switching command.

**Voltage supply**

VEGACAP 64 is a compact instrument, i.e. it can be operated without external evaluation system. The integrated electronics evaluates the level signal and outputs a switching signal. With this switching signal, a connected device can be operated directly (e.g. a warning system, a pump etc.).

The data for power supply are specified in chapter "*Technical data*".

## 3.3 Operation

The probe can be adapted to the dielectric constant of the product directly on the electronics module.

A switching command can be triggered when the probe is covered or laid bare.

On the electronics module you will find the following display and adjustment elements:

- Signal lamp for indication of the switching condition (green/red)
- Potentiometer for switching point adaptation
- DIL switch for measuring range selection
- DIL switch for mode adjustment

## 3.4 Storage and transport

**Packaging**

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE

foil is also used. Dispose of the packaging material via specialised recycling companies.

**Transport**

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

**Transport inspection**

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

**Storage**

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

**Storage and transport temperature**

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

## 3.5 Accessories and replacement parts

**Protective cap**

The protective cover protects the sensor housing against soiling and intense heat from solar radiation.

You will find additional information in the supplementary instructions manual "*Protective cover*" (Document-ID 34296).

**Flanges**

Screwed flanges are available in different versions according to the following standards: DIN 2501, EN 1092-1, BS 10, ANSI B 16.5, JIS B 2210-1984, GOST 12821-80.

You can find additional information in the supplementary instructions manual "*Flanges according to DIN-EN-ASME-JIS*" (Document-ID 31088).

# 4 Mounting

## 4.1 General instructions

**Suitability for the process conditions**

Make sure that all parts of the instrument coming in direct contact with the process, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions, such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" and on the nameplate.

**Switching point**

In general the level switch can be mounted in any position. The instrument must be mounted in such a way that the probe is at the height of the requested switching point.

**Welding work**

Before beginning the welding work, remove the electronics module from the sensor. By doing this, you avoid damage to the electronics through inductive coupling.

**Handling**

With threaded versions, the housing must not be used to screw in the instrument. Applying tightening forces on the housing can damage its internal parts.

Use the hexagon for screwing in.

**Moisture**

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

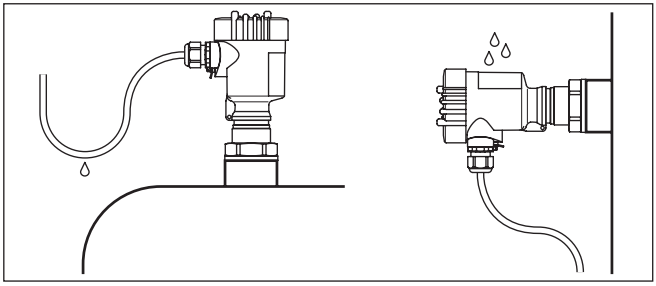

*Fig. 4: Measures against moisture penetration*

**Transport**

Do not hold VEGACAP 64 on the probe. Especially with heavy flange versions or long rod versions, the sensor can be damaged simply by the weight of the instrument.

**Pressure/Vacuum**

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "*Technical data*" or on the type label of the sensor.

## 4.2 Mounting instructions

**Agitators and fluidization**

Due to the effects of agitators, equipment vibration or similar, the level switch can be subjected to strong lateral forces. For this reason, do not use an overly long electrode for VEGACAP 64, but check if you can mount a short level switch on the side of the vessel in horizontal position.

Extreme vibration caused by the system, e.g. due to agitators or turbulence in the vessel from fluidisation, can cause the probe of VEGACAP 64 to vibrate in resonance. If a longer rod version is necessary, you can secure the probe by fastening a suitable brace or guy directly above the end of the rod.

**Inflowing medium**

If the instrument is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount the instrument at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

This applies particularly to instrument versions with a longer probe.

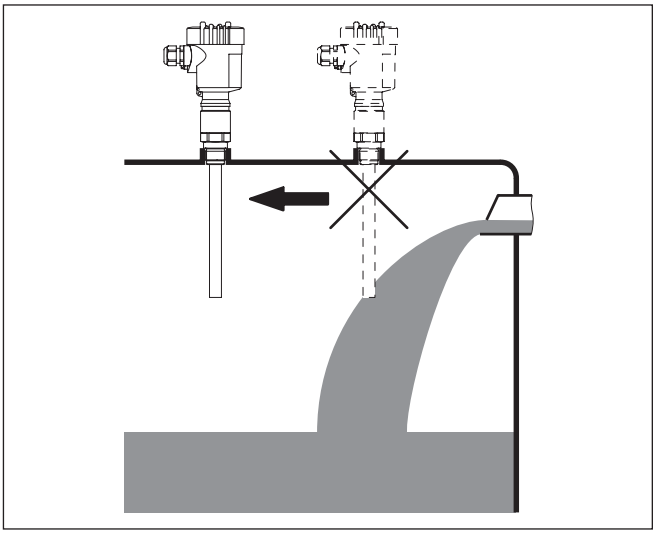

*Fig. 5: Inflowing medium*

**Torque with PTFE plated flanges**

To compensate the normal voltage loss due to sealing materials, you have to additionally use disc springs for fastening flange screws on PTFE coated flanges. Tighten the screws moderately with the torque stated in the technical data.

# 5 Connecting to power supply

## 5.1 Preparing the connection

**Note safety instructions**

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

**Voltage supply**

Connect the operating voltage according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGACAP 64 to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the instrument housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges.

The data for power supply are specified in chapter "*Technical data*".

**Connection cable**

The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

## 5.2 Connection procedure

With Ex instruments, the housing cover may only be opened if there is no explosive atmosphere present.

Proceed as follows:

1. Unscrew the housing cover
2. Loosen compression nut of the cable entry
3. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4. Insert the cable into the sensor through the cable entry
5. Lift the opening levers of the terminals with a screwdriver (see following illustration)
6. Insert the wire ends into the open terminals according to the wiring plan
7. Press down the opening levers of the terminals, you will hear the terminal spring closing
8. Check the hold of the wires in the terminals by lightly pulling on them
9. Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
10. If necessary, carry out a fresh adjustment
11. Screw the housing cover back on

The electrical connection is hence finished.

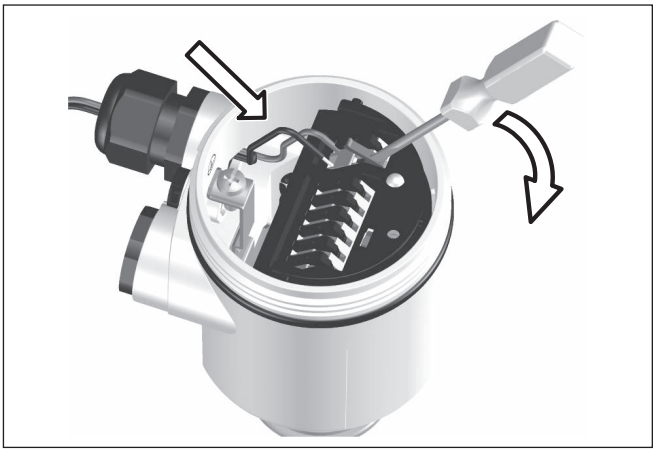

*Fig. 6: Connection steps 5 and 6*

## 5.3 Wiring plan, single chamber housing

**Housing overview**

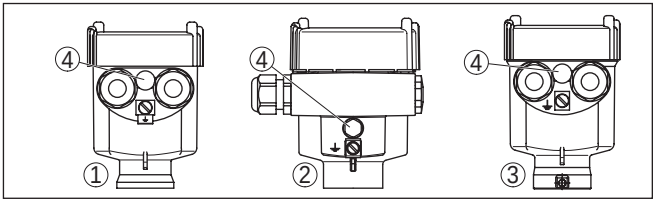


*Fig. 7: Material versions, single chamber housing*

*1 Plastic (not with dust-Ex)*
*2 Aluminium*
*3 Stainless steel*
*4 Filter element for pressure compensation or blind plug with version IP 66/ IP 68, 1 bar*

**Electronics and connection compartment**

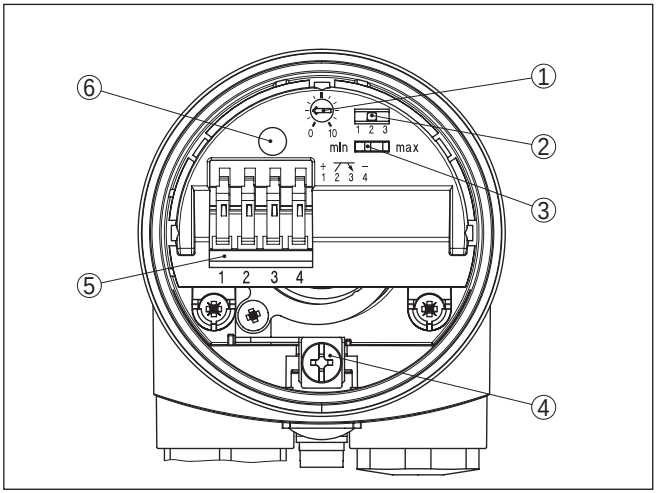


*Fig. 8: Electronics and connection compartment*

*1 Potentiometer for switching point adaptation*
*2 DIL switch for measuring range selection*
*3 DIL switch for mode adjustment*
*4 Ground terminal*
*5 Connection terminals*
*6 Control lamp*

**Wiring plan**

We recommend connecting VEGACAP 64 in such a way that the switching circuit is open when there is a level signal, line break or failure (safe condition).

The instrument is used to control relays, contactors, magnet valves, warning lights, horns as well as PLC inputs.

**Caution:**
There is no reverse polarity protection. Take note of the polarity of the output lines.

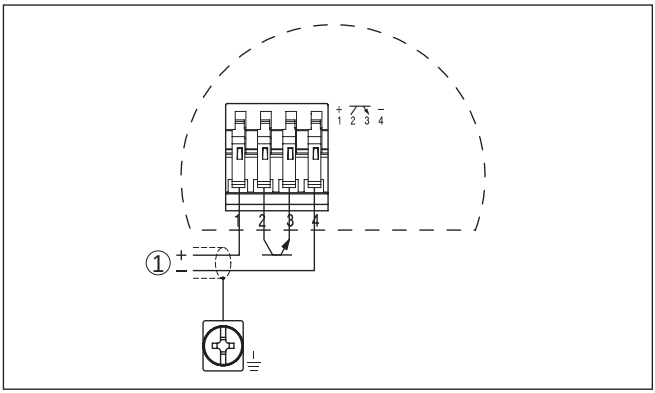


*Fig. 9: Wiring plan*

*1 Voltage supply*

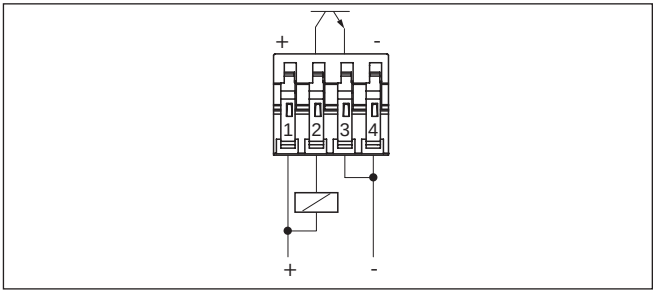


*Fig. 10: NPN action*

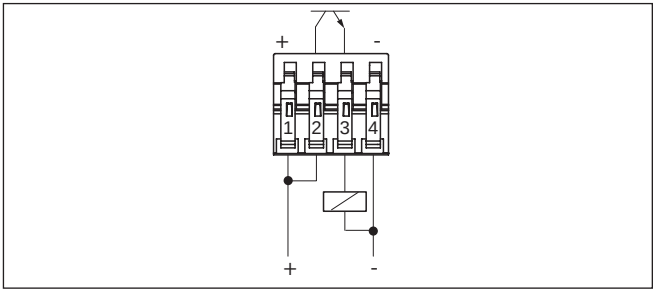


*Fig. 11: PNP action*

## 5.4 Wiring plan - version IP 66/IP 68, 1 bar

**Wire assignment, connection cable**

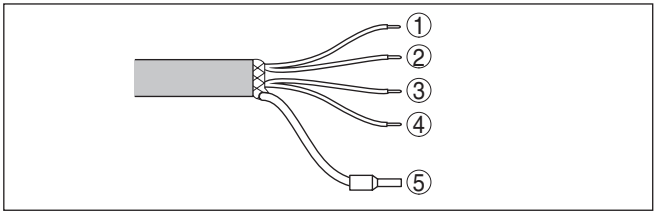


*Fig. 12: Wire assignment connection cable. The numbers of the wires correspond to the terminals of the instrument.*

*1 brown (+) voltage supply*
*2 White*
*3 Yellow*
*4 blue (-) voltage supply*
*5 Shielding*

# 6 Setup

## 6.1 General information

The figures in brackets refer to the following illustrations.

**Function/Configuration**

On the electronics module you will find the following display and adjustment elements:

- Potentiometer for switching point adaptation
- DIL switch for measuring range selection
- DIL switch for mode adjustment - min./max.
- Control lamp

**Note:**
As a rule, always set the mode with the mode switch (3) before starting setup VEGACAP 64. The switching output will change if you set the mode switch (3) afterwards. This could possibly trigger other connected instruments or devices.

## 6.2 Adjustment elements

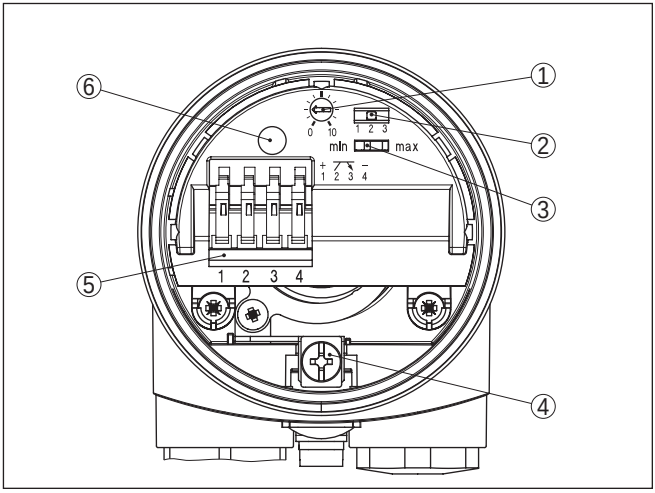


*Fig. 13: Oscillator - Transistor output*

*1 Potentiometer for switching point adaptation*
*2 DIL switch for measuring range selection (with compensation button)*
*3 DIL switch for mode adjustment*
*4 Ground terminal*
*5 Connection terminals*
*6 Control lamp*

The switching status of the electronics can be checked with closed housing (only plastic housing), see "*Function chart*".

**Note:**
Screw the housing cover tightly up to the thread stop so that the inspection glass is above the control lamp (LED).

To adjust VEGACAP 64, first of all remove the housing cover.

**Switching point adaptation (1)**

You can adapt the switching point to the solid with the potentiometer.

**Measuring range selection switch (2)**

With the potentiometer (1) and the measuring range selection switch (2) you can change the sensitivity of the probe to the electrical properties of the product and the conditions in the vessel. This is necessary so that the level switch can also reliably detect products e.g. with very low or very high dielectric figure.

range 1: 0 … 20 pF

Range 2: 0 … 85 pF

Range 3: 0 … 450 pF

**Mode adjustment (3)**

With the mode switch (3) you can change the switching condition of the transistor output. You can set the required mode (max. - max. detection or overfill protection, min. - min. detection or dry run protection).

We recommend connecting according to the quiescent current principle (switching output is opened when the switching point is reached) because the transistor output takes on the same (safe) condition if a failure is detected.

**Signal lamp (6)**

Control lamp for indication of the switching status

- Green = Output closed
- Red = Output open
- red (flashing) = failure

**Switching point adjustment**

The adjustment of the switching point is only possible in installed condition.

The specifications in parenthesis refer to the preceding illustration.

**Horizontally mounted probes, angled probes**

**Mode max. [mode min.]**

1. Set mode switch (3) to mode max [min.].
2. Set meas. range selection switch (2) to range 1.
3. Make sure the probe is not covered by the medium.
4. Turn the potentiometer (1) to 0, the control lamp (6) lights red [lights green].
5. To determine the empty switch point, turn the potentiometer (1) very slowly clockwise until the control lamp lights green [lights red]. If the control lamp still lights red [lights green], then you have to set the meas. range selection switch (2) to the next higher stage and repeat the setting with the potentiometer (1) until the control lamp lights green [lights red].
6. Note the position of the potentiometer (1).

   In some cases the lowest range (range 1 = highest sensitivity) is not sufficient to adjust the full switch point. This would make another filling procedure necessary.

   For this reason we recommend setting and noting the empty switching point in all three meas. ranges. Set the meas. range se-

lection switch (2) to the next higher range and repeat the setting. Also note the values for the next ranges.

7. Reset meas. range selection switch (2) to the next lower range in which the control lamp lights green [lights red].
8. Fill the vessel until the probe is completely covered.
9. Turn the potentiometer (1) very slowly clockwise until the control lamp lights green [lights red].
10. Note the position of the potentiometer (1). We recommend documenting the value of the empty switch point and the full switch point as well as the range.
11. If the control lamp does not light green [light red], then you have to set the meas. range switch (2) to the next higher stage and repeat the setting with the potentiometer until the control lamp lights green [lights red].
12. Set the potentiometer (1) to the average value of the two noted values.

The measuring system is now ready for operation.

| | Empty adjustment | Full adjustment |
|---|---|---|
| range 1 | | |
| range 2 | | |
| range 3 | | |

Note the position of the potentiometer.

**Note:**
If you do not find the full switch point in one of the ranges, we recommend setting the meas. range selection switch (2) to the lowest range in which you have found the empty switch point. Set the potentiometer (1) to the average value between empty switch point and 10.

**Vertically mounted probes**

**Mode max. (max. level detection)**

1. Set mode switch (3) to mode max.
2. Set meas. range selection switch (2) to range 1.
3. Fill the vessel up to the requested level.
4. Turn potentiometer (1) to position 10.

   When the control lamp (6) lights red: set the measuring range selection switch (2) to the next higher measuring range.

   When the control lamp (6) lights green: continue with the next item.
5. Turn the potentiometer (1) very slowly anticlockwise until the control lamp (6) lights red.

The measuring system is now ready for operation.

**Mode min. (min. level detection)**

1. Set mode switch (3) to mode min.
2. Set meas. range selection switch (2) to range 1.
3. Lower the level to the requested min. level.
4. Turn the potentiometer (1) to 0, the control lamp (6) lights green.

5. Turn the potentiometer (1) very slowly clockwise until the control lamp (6) lights red. If the control lamp does not light red, set the meas. range selection switch (2) to the next higher stage and repeat the setting with the potentiometer (1) until the control lamp lights red.

The measuring system is now ready for operation.

## 6.3 Function chart

The following chart provides an overview of the switching conditions depending on the set mode and the level.

| | Level | Switching status | Control lamp |
|---|---|---|---|
| Mode max.<br>Overflow protection | | closed | Green |
| Mode max.<br>Overflow protection | | open | Red |
| Mode min.<br>Dry run protection | | closed | Green |
| Mode min.<br>Dry run protection | | open | Red |
| Failure of the supply voltage<br>(min./max. mode) | any | open | ○ |
| Fault | any | open | flashes red |

# 7 Maintenance and fault rectification

## 7.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

## 7.2 Rectify faults

**Reaction when malfunctions occur**

The operator of the system is responsible for taking suitable measures to rectify faults.

**Failure reasons**

VEGACAP 64 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

**Fault rectification**

The first measure to be taken is to check the output signal. In many cases, the causes can be determined this way and the faults rectified.

**24 hour service hotline**

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

**Checking the switching signal**

| Error | Cause | Rectification |
|---|---|---|
| – The instrument signals covered without covering with the medium<br>– The instrument signals covered with covering with the medium | Wrong mode selected | Set the correct mode on the mode switch (max.: overfill protection, min.: dry run protection) |
| | Operating voltage too low | Check operating voltage |
| | Shortcircuit in the probe, e.g. because of moisture in the housing | Remove the electronics module. Check the resistance between the marked plug connections. See the following instructions. |
| | Electronics defective | – Push mode switch (min./max.)<br>— If the probe then does not change the mode, the electronics module may be defective. Exchange the electronics module<br>— If the instrument then changes the mode, the instrument is mechanically damaged. Should the switching function in the correct mode still be faulty - return the probe for repair. |

| Error | Cause | Rectification |
|---|---|---|
| Signal lamp flashes red | Electronics module has detected a failure | Exchange the instrument or send it in for repair |

**Check the resistance in the probe**

Remove the electronics module. Check the resistance between the two plug connections.

There must no longer be a connection (high impedance). If there is still a connection - exchange the instrument or return it for repair

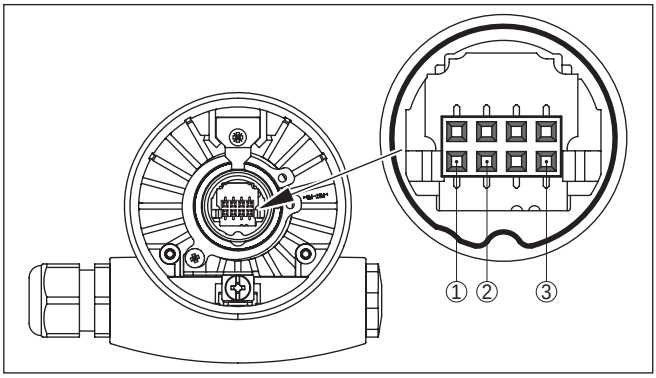


*Fig. 24: Check the resistance in the probe*

*1 Shielding*
*2 Probe*
*3 Ground potential*

**Reaction after fault rectification**

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Set up*" may have to be carried out again.

## 7.3 Exchange of the electronics module

In general, all electronics modules of series CP60 can be interchanged. If you want to use an electronics module with a different signal output, you can download the corresponding operating instructions manual from our homepage under Downloads.

Proceed as follows:

1. Switch off power supply
2. Unscrew the housing cover
3. Lift the opening levers of the terminals with a screwdriver
4. Pull the connection cables out of the terminals
5. Loosen the two screws with a screw driver (Torx size T10 or slot 4)

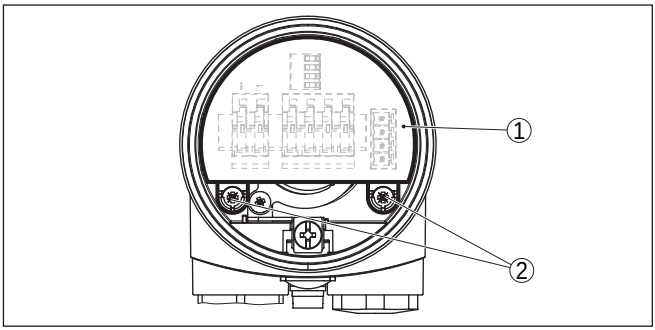


*Fig. 25: Loosening the holding screws*

*1 Electronics module*
*2 Screws (2 pcs.)*

6. Pull out the old electronics module
7. Compare the new electronics module with the old one. The type label of the electronics module must correspond to that of the old electronics module. This applies particularly to instruments used in hazardous areas.
8. Compare the settings of the two electronics modules. Set the adjustment elements of the new electronics module to the same setting of the old one.

**Information:**
Make sure that the housing is not rotated during the electronics exchange. Otherwise the plug may be in a different position later.

9. Insert the electronics module carefully. Make sure that the plug is in the correct position.
10. Screw in and tighten the two holding screws with a screwdriver (Torx size T10 or Phillips 4)
11. Insert the wire ends into the open terminals according to the wiring plan
12. Press down the opening levers of the terminals, you will hear the terminal spring closing
13. Check the hold of the wires in the terminals by lightly pulling on them
14. Check cable gland on tightness. The seal ring must completely encircle the cable.
15. Mount the probe into the vessel. Make sure that the probe is uncovered.

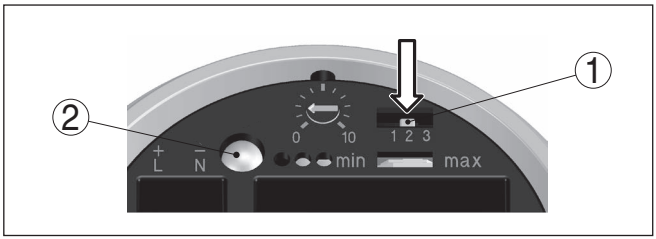


*Fig. 26: Compensation key*

*1 Measuring range selection switch (compensation key)*
*2 Control lamp*

16. Keep the measuring range selection switch (1) pushed until the control lamp (2) flashes green.
17. Carry out the adjustment again. See chapter "*Set-up, adjustment elements*".
18. Screw the housing cover back on

The electronics exchange is now finished.

## 7.4 How to proceed in case of repair

You can find a repair form as well as detailed information on how to proceed under www.vega.com/downloads and "*Forms and certificates*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact for the return shipment the agency serving you. You can find the agency on our home page www.vega.com.

# 8 Dismounting

## 8.1 Dismounting steps

**Warning:**
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

## 8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the parts to be easily separable.

**WEEE directive 2002/96/EG**
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

# 9 Supplement

## 9.1 Technical data

**General data**

| | |
|---|---|
| Material 316L corresponds to 1.4404 or 1.4435 | |
| Materials, wetted parts | |
| – Process fitting - thread | 316L |
| – Process fitting - flange | 316L |
| – Process seal | Klingersil C-4400 |
| – insulation (fully insulated) | PTFE |
| – Probe (rod PTFE fully insulated: ø 16 mm/0.63 in) | 316L |
| Materials, non-wetted parts | |
| – Plastic housing | plastic PBT (Polyester) |
| – Aluminium die-casting housing | Aluminium die-casting AlSi10Mg, powder-coated - basis: Polyester |
| – Stainless steel housing - precision casting | 316L |
| – Stainless steel housing, electropolished | 316L |
| – Seal between housing and housing cover | NBR (stainless steel housing, precision casting), silicone (aluminium/plastic housing; stainless steel housing, electropolished) |
| – Ground terminal | 316L |
| Process fittings | |
| – Pipe thread, cylindrical (DIN 3852-A) | G1 A, G1½ A |
| – American pipe thread, conical (ASME B1.20.1) | 1 NPT, 1½ NPT |
| – Flanges | DIN from DN 50, ANSI from 2" |
| Weight | |
| – Instrument weight (depending on process fitting) | 0.8 … 4 kg (0.18 … 8.82 lbs) |
| – Rod weight: ø 16 mm (0.63 in) | 1100 g/m (12 oz/ft) |
| Sensor length (L) | |
| – Process fitting: thread and flanges | 0.15 … 6 m (0.492 … 19.69 ft) |
| – Process fitting: Flanges - PTFE plated | 0.15 … 6 m (0.492 … 19.69 ft) |
| Max. lateral load | 10 Nm (7.4 lbf ft) |
| Torque of the flange screws (min.) | 60 Nm (44.25 lbf ft) |
| Max. torque (process fitting - thread) | 100 Nm (74 lbf ft) |
| Measuring frequency | 430 kHz |

**Output variable**

| | |
|---|---|
| Output | Floating transistor output, permanently shortcircuit-proof |

| | |
|---|---|
| Load current | < 400 mA |
| Switching voltage | < 55 V DC |
| Blocking current | < 100 µA |
| Modes (switchable) | Min./Max. |
| Switching delay | |
| – When immersed | 0.7 s |
| – When laid bare | 0.7 s |
| – In case of failure | 1 s |

**Ambient conditions**

| | |
|---|---|
| Ambient temperature on the housing | -40 … +80 °C (-40 … +176 °F) |
| Storage and transport temperature | -40 … +80 °C (-40 … +176 °F) |

**Process conditions**

| | |
|---|---|
| Process pressure | |
| – Threaded versions | -1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psig), depending on the process fitting |
| – Flange version | -1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psig), depending on the process fitting |
| – Flange version ≥ 3"/DN 80, plated | -0.4 … 64 bar/-40 … 6400 kPa (-5.8 … 928 psig), depending on the process fitting |
| Process temperature VEGACAP 64 of 316L | -50 … +150 °C (-58 … +302 °F) |
| Process temperature (thread or flange temperature) with temperature adapter (option) | -50 … +200 °C (-58 … +392 °F) |

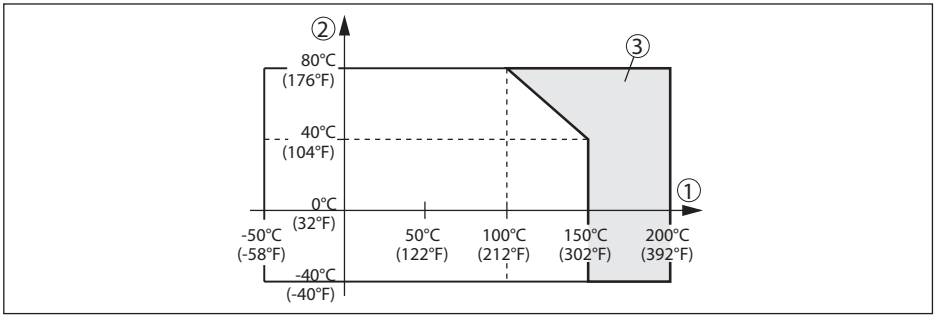


*Fig. 27: Ambient temperature - Process temperature*

*1 Process temperature*
*2 Ambient temperature*
*3 Temperature range with temperature adapter*

| | |
|---|---|
| Dielectric constant | ≥ 1.5 |

| Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar | |
|---|---|
| Cable entry/plug[1] | |
| – Single chamber housing | – 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind plug M20 x 1.5<br>or:<br>– 1 x closing cap ½ NPT, 1 x blind plug ½ NPT<br>or:<br>– 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5 |
| Spring-loaded terminals | for wire cross-section up to 1.5 mm² (AWG 16) |

| Electromechanical data - version IP 66/IP 68 (1 bar) | |
|---|---|
| Cable entry | |
| – Single chamber housing | – 1 x IP 68 cable gland M20 x 1.5; 1 x blind plug M20 x 1.5<br>or:<br>– 1 x closing cap ½ NPT, 1 x blind plug ½ NPT |
| Connection cable | |
| – Wire cross-section | > 0.5 mm² (AWG 20) |
| – Wire resistance | < 0.036 Ω/m (0.011 Ω/ft) |
| – Tensile strength | < 1200 N (270 lbf) |
| – Standard length | 5 m (16.4 ft) |
| – Max. length | 1000 m (3280 ft) |
| – Min. bending radius | 25 mm (0.984 in) with 25 °C (77 °F) |
| – Diameter approx. | 8 mm (0.315 in) |
| – Colour - standard PE | Black |
| – Colour - standard PUR | Blue |
| – Colour - Ex-version | Blue |

| Adjustment elements | |
|---|---|
| Mode switch | |
| – Min. | Min. detection or dry run protection |
| – Max. | Max. detection or overflow protection |
| DIL switch for measuring range selection | |
| – range 1 | 0 … 20 pF |
| – range 2 | 0 … 85 pF |
| – range 3 | 0 … 450 pF |
| Potentiometer | Switching point adaptation |

| Voltage supply | |
|---|---|
| Operating voltage | 10 … 55 V DC |
| Power consumption | max. 0.5 W |

[1] Depending on the version M12 x 1, according to ISO 4400, Harting, 7/8" FF.

## Electrical protective measures

| | |
|---|---|
| Protection rating | |
| – Plastic housing | IP 66/IP 67 |
| – Aluminium and stainless steel standard | IP 66/IP 68 (0.2 bar)[2] |
| – Aluminium and stainless housing (optionally available) | IP 66/IP 68 (1 bar) |
| Overvoltage category | III |
| Protection class | II |

## Functional safety (SIL)

Functional safety is already activated on instruments with SIL qualification ex factory. On instruments without SIL qualification ex factory, the functional safety must be activated by the user via the display and adjustment module or via PACTware for applications according to SIL.

Functional safety according to IEC 61508-4

| | |
|---|---|
| – Single channel architecture (1oo1D) | up to SIL2 |
| – double channel diversitary redundant architecture (1oo2D) | up to SIL3 |

You can find detailed information in the supplied Safety Manual of the instrument series or under "www.vega.com", "*Downloads*", "*Approvals*".

## Approvals

Instruments with approvals can have different technical data depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded under www.vega.com via "*VEGA Tools*" and "*serial number search*" as well as via "*Downloads*" and "*Approvals*".

[2] A suitable cable is the prerequisite for maintaining the protection rating.

## 9.2 Dimensions

### Housing in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

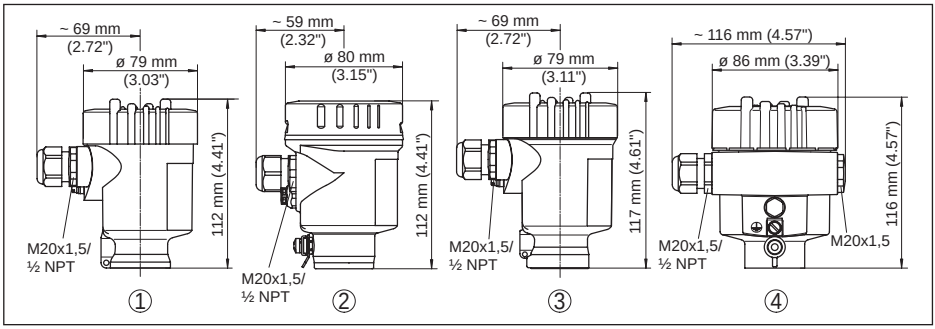


*Fig. 28: Housing versions in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar*

1 *Plastic housing*
2 *Stainless steel housing, electropolished*
3 *Stainless steel housing, precision casting*
4 *Aluminium housing*

### Housing in protection IP 66/IP 68 (1 bar)

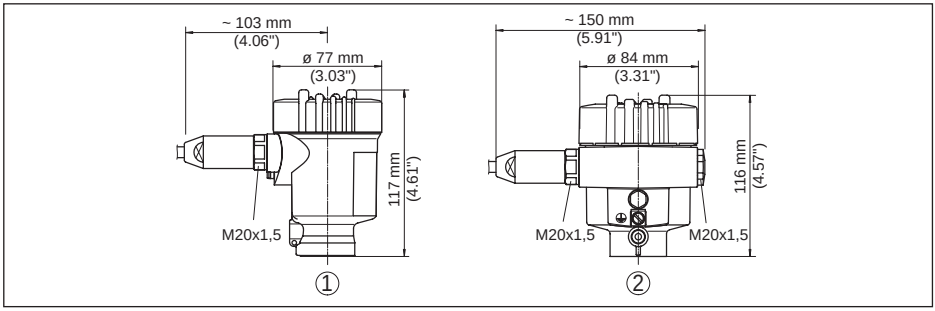


*Fig. 29: Housing versions with protection rating IP 66/IP 68 (1 bar)*

1 *Stainless steel housing, precision casting*
2 *Aluminium housing*

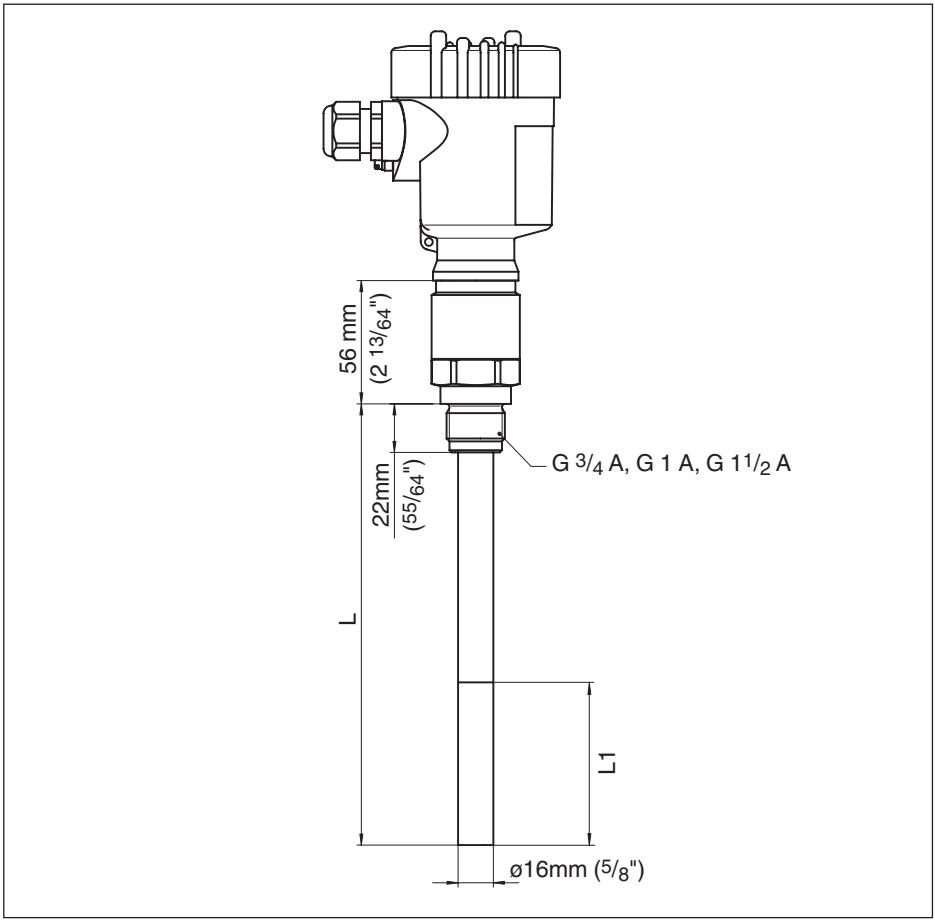


*Fig. 30: VEGACAP 64, threaded version G1 A (ISO 228 T1)*

*L = Sensor length, see chapter "Technical data"*
*L1 = active length*

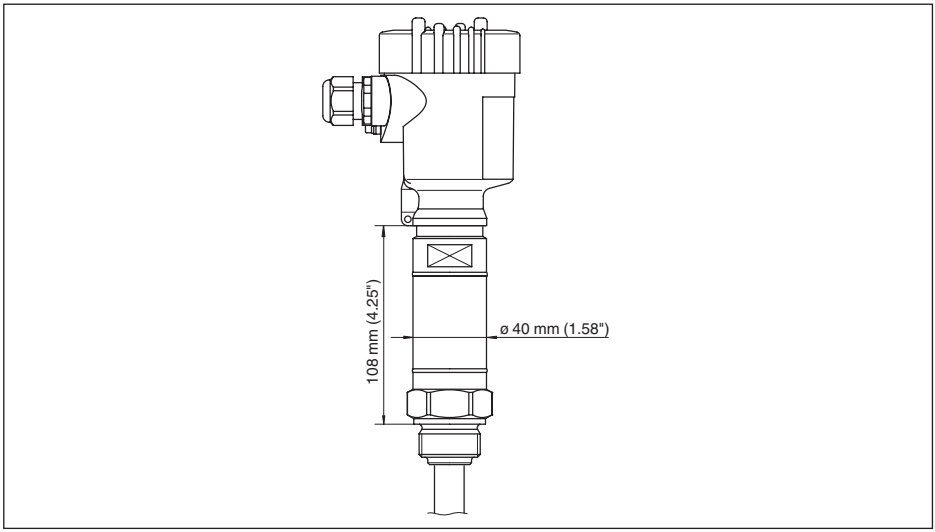


*Fig. 31: Temperature adapter*

## 9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

Only in U.S.A.: Further information see patent label at the sensor housing.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

Nähere Informationen unter www.vega.com.

Les lignes de produits VEGA sont globalement protégées par des droits de propriété intellectuelle. Pour plus d'informations, on pourra se référer au site www.vega.com.

VEGA lineas de productos están protegidas por los derechos en el campo de la propiedad industrial. Para mayor información revise la pagina web www.vega.com.

Линии продукции фирмы ВЕГА защищаются по всему миру правами на интеллектуальную собственность. Дальнейшую информацию смотрите на сайте www.vega.com.

VEGA系列产品在全球享有知识产权保护。

进一步信息请参见网站<www.vega.com>。

## 9.4 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/ originator.

30014-EN-130916

Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
Subject to change without prior notice

© VEGA Grieshaber KG, Schiltach/Germany 2013

30014-EN-130916

VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany

Phone +49 7836 50-0
Fax +49 7836 50-201
E-mail: info.de@vega.com
www.vega.com